

1.0 DEAD COLT CREEK TMDL IMPLEMENTATION PROJECT PROPOSAL SUMMARY SHEET

Dead Colt Creek TMDL Implementation Project

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State - North Dakota

Watershed – Sheyenne River

Hydrological Unit Code – 9020204-060

High priority Watershed - yes

Project Type

Watershed

Waterbody Types

Stream/Lake

NPS Category

Agricultural

Project Location: Latitude - 46 degrees 26 minutes Longitude - 97 degrees 41 minutes

Major Goals: This watershed project has one main goal. The main goal of this project is to implement the nutrient, sediment and dissolved oxygen TMDLs for Dead Colt Creek Dam. The TMDLs were finalized in 2006. Implementation of these TMDLs will restore the recreational and aquatic uses of Dead Colt Creek Dam. The recreational and aquatic uses can be restored by reducing the sediment/nutrient loads from 12,614 acres of crop/pasture/rangeland (appendix A1). These acres were identified as being critical during the 2002/2003 Dead Colt Creek TMDL assessment by the Agricultural Nonpoint Source Pollution (AGNPS) model and during the land use assessment. Originally 15,324 acres were identified as being critical. 2,710 acres (appendix A2) were treated with BMPs during the 2005-2010 Ransom County Sheyenne River Watershed Project. These goal will be accomplished by providing financial and technical assistance for conservation planning, best management practice (BMP) implementation and promoting a strong informational/educational (I/E) program. The I/E program will focus on providing farmers and ranchers information on the causes and effects of non-point source (NPS) pollution and ways to reduce or eliminate NPS pollution.

Project Description: To reduce the cumulative effects of NPS pollution within the Dead Colt Creek Dam, the Ransom County Soil Conservation District, NRCS and FSA will provide financial and technical assistance for conservation planning and provide increased emphasis on NPS Pollution in there I/E program. Through these efforts the project sponsors plan to address the following: 1) Reduce the sediment and nutrient inputs from 12,614 acres of crop/pasture/rangeland within the Dead Colt Creek Watershed, , 2) Document water quality improvements as BMPs are installed by monitoring water quality trends and land use changes through a water sampling plan (see section 5.0) and AGNPS modeling (see section 5.4), and 3) Increase public awareness to the causes, effects and solutions to NPS pollution. Funds provided by various USDA programs and the Section 319 program will be used to provide financial and technical assistance for the implementation of planned BMPs and scheduled I/E activities.

Funding

FY 2010 319 Funds requested: \$569,958 (incremental)

Match: \$379,972 Other Federal Funds: \$830,000

Total Project Cost: \$1,779,930 319 Funded Full Time Personnel: 1

2.0 Statement of Need

2.1 Project Reference

The Dead Colt Creek Watershed (HUC 9020204) is part of the Red River of the North Basin. The Dead Colt Creek Watershed is a tributary of the Sheyenne River. The Dead Colt Creek TMDL lists the Dead Colt Creek Dam as fully supporting but threatened for the designated uses of aquatic life and recreation. The causes of impairments for aquatic life use are organic enrichment, nutrients and eutrophication. The cause of impairments for recreation use is low dissolved oxygen, and nutrients/eutrophication. Phosphorous is the limiting nutrient in the Dead Colt Creek Reservoir.

See section 2.5 for more information on water quality. The key parts of the Dead Colt Creek TMDL are attached in Appendix F.

2.2 Waterbody Description

The Dead Colt Creek Dam Watershed (41,400 acres) is located in Ransom and Sargent Counties (appendix B1, B4). The majority of the watershed lies in Ransom County. Dead Colt Creek flows intermittently throughout the year. Flows are influenced by spring snowmelt and spring, summer and fall rains. The Dead Colt Creek Dam is located approximately ½ mile upstream from where Dead Colt Creek empties into the Sheyenne River. The Dead Colt Creek Dam is a 98.5 acre impoundment that was created in 1983 by damming Dead Colt Creek. It was constructed to create a recreational facility and to provide flood protection. There are 55 miles of tributary streams in the Dead Colt Creek Watershed upstream of the Dead Colt Creek Dam. The average depth is 18 feet. The volume of the dam is 1,767.8 acre-feet. Dead Colt Creek Dam has been classified as a Class 3 warm-water fishery. The dam supports bluegill, largemouth bass, smallmouth bass, walleye, white crappie, and yellow bullhead. The lake is currently classified as hypereutrophic. A TMDL has been developed for Dead Colt Creek Dam.

2.4 General Information

The Dead Colt Creek Dam Watershed covers approximately 41,500 acres in Ransom and Sargent Counties in Southeastern North Dakota. The majority of the watershed lies in Ransom County. The Dead Colt Creek Dam Watershed lies entirely within the Northern Glaciated Plains ecoregion. This ecoregion is characterized by flat to gently rolling terrain composed primarily of glacial drift.

The dominant soils association in the Dead Colt Creek Dam Watershed, is Barnes-Svea-Hamerly 75% followed by Hecla-Hamar-Ulen 10%, Gwinner-Hamerly-Parnell 10% Lapraire-Renshaw-Buse 5%. The Barnes-Svea-Hamerly association consists of level to gently rolling topography with knolls, discontinuous ridges, and depressions¹. The major land use is for cultivated crops. Wind and water erosion can be a concern on these soils. The Hecla-Hamar-Ulen association is characterized by level to gently sloping topography, which occurs on glacial outwash plains and deltas. This association is used primarily for crop production¹. The LaPraire-Renshaw-Buse association is characterized by level narrow bottom lands, which are used for crop production, and steep valley sides with numerous branching ravines, which are used for rangeland and wildlife habitat. The major concerns of this association are flooding on the bottom lands and water erosion on the valley sides. The Gwinner-Hamerly-Parnell association is characterized by nearly level topography with swales, knolls and depressions. The average annual soil loss (T) ranges from 2 – 5 tons/acre/year.

¹ Natural Resource Conservation Service.2002. Soil Survey of Ransom County, North Dakota. Natural Resource Conservation Service, United States Department of Agriculture, Washington, DC.

The climate of this region is subhumid. The average annual precipitation is approximately 19 inches. 78%, about 15 inches, occurs during the growing season, April through September. Average snowfall is approximately 34 inches. The average daily summer temperature is 85 degrees Fahrenheit. Northwest is the prevailing wind direction. 11.5 miles per hour is the average annual wind speed.

Land use within the Dead Colt Creek Dam Watershed is primarily agricultural (98.9%). It is 81.6% cropland, 13.8% CRP, 3.5% rangeland/pasture (appendix B2). The remainder is low density residential land and water. The major crops grown are corn, soybeans, spring wheat and sunflowers. Minor crops are dry beans, millet, potatoes and winter wheat. Spring wheat, corn, soybeans is a typical rotation within the watershed. There are approximately 1000 acres under irrigation.

2.5 Water Quality and AGNPS Analysis

In 2002, the Ransom County Soil Conservation District (SCD), along with the NDDH began a two- year developmental project to assess water and land use conditions in the Dead Colt Creek Dam Watershed in Ransom County. The focus of this project was to identify impairments or threats to the beneficial uses of Dead Colt Creek Dam and establish a TMDL for Dead Colt Creek Dam. Nutrient, sediment and dissolved oxygen TMDLs were set in 2006 for the Dead Colt Creek Dam. Water quality results and land use conditions were analyzed to evaluate the extent of impairment from nonpoint source pollution. The AGNPS 3.65v was used to model conditions before and after potential BMP installations. Please refer to the Dead Colt Creek TMDL report for more information.

Analysis of the land use data indicates three specific land management concerns within the Dead Colt Creek Dam Watershed: First, encroachment of the riparian zone by cropland; Second, low residue amounts left after spring seeding; and Third, over grazed pasture and rangeland.

Water quality samples were collected at 4 sites during 2002 and 2003 in the Dead Colt Creek Dam Watershed.. 2 sites were located within the reservoir, one in the deepest part of the lake (380340) and one at the inlet (380342). 2 sample sites were located on Dead Creek which feeds the reservoir. 1 site was located at the inlet of the creek (380341) and one at the outlet of the reservoir (385166). Appendix B3 shows the location of the sampling sites. The sample parameters for Dead Colt Creek Dam are listed in Table 4.

Table 4	Sampling parameters		
Stage	Total Kjeldahl N	pH	Anions
Temperature	Ammonia N	Total alkalinity	Secchi Depth
DO	Nitrate plus Nitrite N	Chloride	
TP	Total N	Specific conductance	
Dissolved P	TSS	Chlorophyll-a	
Dissolved N	TDS	Cations	

Table 5 shows the average values for 7 parameters for the two in lake sampling sites.

Table 5	Average values for in lake sampling sites		
<u>Parameter</u>	<u>380342</u>	<u>380340</u>	<u>Area-weighted mean</u>
Total P (mg/L)	0.031	0.072	0.064
Dissolved P (mg/L)	0.016	0.030	0.027
Total N (mg/L)	0.910	1.062	1.031
Total Kjeldahl N (mg/L)	0.833	0.911	0.895
Nitrate/Nitrite (mg/L)	0.077	0.151	0.136
Chlorophyll-a (ug/L)	12.00	9.00	9.60
Secchi Disk Depth (meters)	1.90	1.80	1.82

Table 6 shows the median concentrations for TN, TP and TSS for stations 380341 and 385166 located at the inlet and outlet of Dead Colt Creek.

Table 6 Median concentrations

Station	TN	TP	TSS
380341	1.75	0.47	10.0
385166	0.57	0.04	2.5

Water quality samples are currently being taken. The results of these samples will not be available until early in 2010. The lake is currently being sampled at the deepest site only 380340. The samples are being analyzed for nutrients, dissolved phosphorous, chlorophyll and dissolved oxygen content.

The Dead Colt Creek TMDL report indicates that Carlson's Trophic State Index (TSI) is the primary indicator used to assess beneficial uses in the state's lakes and reservoirs. The Dead Colt Creek TMDL report lists Dead Colt Creek Dam being impaired for recreation and aquatic life use. It is listed as being fully supporting but threatened for each beneficial use. Water quality data within the Dead Colt Creek TMDL report indicate that Dead Colt Creek is a hypereutrophic lake. Dead Colt Creek Dam has a TN to TP ratio of 16:1. Ratios above 7.2 generally indicate that phosphorous is the limiting nutrient. Dead Colt Creek Dam has a Carlson's trophic state index of 65.82 for TP. Appendix F1 shows Carlson's TSI values for different samples collected. Values above 60 indicate a hypereutrophic state.

Table7. Carlson's trophic state indices for Dead Colt Creek Dam.

Parameter	Relationship	Units	TSI Value
Chlorophyll- <i>a</i>	$TSI (Chl-a) = 30.6 + 9.81[\ln(Chl-a)]$	µg/L	52.15
Total Phosphorus (TP)	$TSI (TP) = 4.15 + 14.42[\ln(TP)]$	µg/L	65.82
Secchi Depth (SD)	$TSI (SD) = 60 - 14.41[\ln(SD)]$	meters	51.53
Total Nitrogen (TN)	$TSI (TN) = 54.45 + 14.43[\ln(TN)]$	µg/L	—

TSI < 40 - Oligotrophic (least productive)

TSI > 60 - Hypereutrophic (most productive)

A Carlson's TSI target of 57.55 for total phosphorous was set for Dead Colt Creek Dam. This TSI target was chosen based on knowledge that 1) phosphorous is the limiting nutrient in Dead Colt Creek Dam, 2) AGNPS modeling shows that a 70% reduction is the maximum attainable phosphorous reduction by instituting BMPS on the critical cells in the watershed, and 3) a 70% reduction in phosphorous will reduce chlorophyll-a concentration, increase water clarity and dissolved oxygen and decrease the productivity level of the reservoir. The TMDL goal for phosphorous in Dead Colt Creek Dam is to reduce the in-lake annual mean total phosphorous by 70%. This reflects an inlake target concentration of 0.041mg/L. BMPs installed to reduce phosphorous will optimistically reduce nitrogen as well.

The AGNPS computer model was used to locate critical areas within the Dead Colt Creek Watershed (appendix A1). See section 5.4 for a more detailed discussion of AGNPS. The results from the initial run identified 14,480 acres of critical cropland and 844 acres of critical pasture/rangeland. There were no livestock feeding areas identified as being critical. The model was run a second time with all of the critical acres targeted. The results were similar to the load reductions needed to achieve the 70% reduction in phosphorous concentrations for the Dead Colt Creek TMDL. 2,710 acres of cropland was treated in the watershed during the Ransom County Lower Sheyenne Watershed Project 2005-2010. 17% of the critical areas were treated during this project (appendix A2). The AGNPS model was rerun with these areas removed. Results can be

seen in section 5.4. AGNPS will again be used to identify specific priority areas for BMP implementations and monitor effectiveness of the project.

One site within the watershed was sampled for macro invertebrate index of biotic integrity (MIBI).

Table 3: Summary of MIBI scores

Site	MIBI score	Integrity rating
551220	37	Fair

The Stream Visual Assessment Protocol (SVAP) was used to evaluate the condition of the riparian area within the watershed. The SVAP evaluation looks at 10 aspects of the riparian area. They are channel condition, hydrologic alteration, riparian zone, bank stability, water appearance, nutrient enrichment; barriers to fish; instream fish cover; pools and insect/invertebrate habitat. A score is given for each aspect ranging from 1- 10, with 10 being the highest score and 1 the lowest. The scores are added together and divided by the number of aspects that were evaluated. This gives the overall score for the site. A score of >9.0 is excellent, 7.5-8.9 is good, 6.1-7.4 is fair and <6.0 is poor. 11 sites were evaluated within the Dead Colt Creek watershed. Scores ranged from a high of 7.7 to a low of 2.7. 8 sites scored in the poor category, 2 sites in the fair category, and 1 site in the good category. The main causes of impairment were cropland encroachment of the riparian area and overgrazing.

The water quality, landuse assessment, AGNPS and SVAP data collected during the Dead Colt Creek TMDL project indicates that the primary sources of nutrients (nitrogen and phosphorus) are runoff of commercial fertilizer from cropland, runoff of manure from pasture/rangeland, runoff of sediment with attached nutrients (phosphorous) from cropland and runoff of organic residues from cropland and pasture/rangeland.

Four main conclusions can be drawn from the results of the Dead Colt Creek TMDL report:

- The amount and type of NPS pollution affecting water quality within the Dead Colt Creek Dam is directly related to the type of land use and land management strategies within the watershed
- The current amount of nutrients entering the watershed is degrading the biological and recreational uses within Dead Colt Creek Dam.
- BMP implementation and improved land management strategies could restore the biological and recreational uses of the Dead Colt Creek Dam
- BMP implementation should be targeted to the high priority areas identified by the AGNPS model

The beneficial uses within the Dead Colt Creek Dam can be restored to fully supporting by positive changes in land management and land use. The installation of BMPs, such as no-till, nutrient management, prescribed grazing systems, riparian buffers, filter strips and riparian easements in critical areas, will reduce the amount of nutrients in Dead Colt Creek Dam. A strong I/E program will help to inform farmers and ranchers of the benefits of BMPs and the effect that NPS pollution has on water quality. Overall, the assessment data indicates serious water quality concerns within the project area. These concerns can be addressed if the project moves into implementation.

3.0 Project Description

3.1 Goals

This project has one main goal. The goal of this project is to restore the recreational and aquatic uses of the Dead Colt Creek Dam by implementing the Dead Colt Creek TMDL. This will be accomplished by the following objectives and tasks.

3.2 Objectives

Objective 1- Hire staff to coordinate and organize the project with other local agencies (i.e. NRCS, NDSU EXT, water resource, county and city boards) and provide technical assistance to farmers and ranchers in the Dead Colt Creek Watershed.

Task 1- Employ one watershed coordinator to coordinate the project and provide one-on-one conservation planning assistance to producers in the project area. Includes salary/fringe, travel, equipment, training and telephone.

Product- One watershed coordinator (full time)

Cost - \$269,750

Objective 2 – Achieve inflake target concentrations of 0.041 mg/L of mean total phosphorous in Dead Colt Creek Dam. This would equate to a 70% reduction in phosphorous. This was the TMDL goal set for phosphorous.

Task 2 – Provide assistance to farmers and ranchers to implement BMPs to reduce nutrient and sediment loads from 12,614 acres of crop/pasture/rangeland identified as critical by AGNPS (appendix A1, A2)

Product- Conservation planning for 2,522.8 acres in 2010(approx. 5 plans); 2,522.8 acres in 2011 (approx. 5 plans); 2,522.8 acres in 2012 (approx. 5 plans); 2,522.8 acres in 2013 (approx. 5 plans); and 2,522.8 acres in 2014 (approx. 5 plans). (see appendix C3- BMP Budget Table)

Cost – \$400,608 Section 319 Funds, \$330,000 NRCS EQIP Funds

Task 3- Improve the health and function of 10 miles of the riparian corridor in the Dead Colt Creek Watershed through the use of CRP riparian buffers and filterstrips

Product – Improved water quality within treated areas (appendix C3)

Cost – \$500,000

Task 4 – Conduct follow up contacts to assist with conservation plan updates and Monitor O&M of Section 319 cost-shared practices.

Product – Database of applied BMPs

Cost – Included in task 1

Objective 3 – Document long term and short term water quality improvements (i.e. reductions in nutrient loads) by monitoring water quality trends and AGNPS modeling as BMPs are installed.

Task 5– Obtain sample collection training and collect samples throughout the project period to document changes in water quality trends as BMPs are installed. Samples will be collected according to the Quality Assurance Sampling Plan (QAPP) (see Section 5.0).

Product – Minimum of 20 water quality samples/site/year

Cost – \$5,000

Task 6 – Compile water quality data and BMP installation records to track project efficiency.

Product- Update AGNPS on a semi-annual basis to reflect BMPs installed over project life. Model will be run and outputs in nutrient will be compared with original model outputs to assess BMP efficiency.

Cost – Included in Task 1

Product- Documentation of land use and water quality trends for incorporation into annual reports.

Cost- Included in Task 1.

Objective 4- Increase public awareness on the impacts of and solutions to NPS pollution.

Task 7 – Organize and conduct I/E events that focus on NPS pollution control within Dead Colt Creek Dam and coordinate with ongoing state/federal sponsored I/E programs.

Product – Five workshops, Five tours/demonstrations, and five informational meetings.

Cost - \$5,000

Task 8– Prepare newsletter articles and direct mailings to local land users, general public and media to promote project and disseminate information on water quality and NPS pollution control

Product – Minimum of five newsletters, 25 news releases, and six direct mailings.

Cost - \$2,500

Task 9 - Complete annual and final project reports to update the GRTS. These will be provided to NDDH, EPA and all sponsors and interested individuals.

Product – Annual reports, and one final report.

Cost – included in task 1.

3.3 Milestone: See attached milestone, (appendix C5)

3.4 Permits

All necessary permits will be acquired. These may include CWA Section 404 permits. Project staff will work with the NDDH to determine if National Pollution Elimination System permits are needed for the proposed livestock waste systems.

3.5 Appropriateness of lead sponsor

The Ransom County SCD is sponsoring this water quality project. The Ransom County SCD's annual and long range plans help to prioritize and provide guidance to the field staff. The Ransom County SCD board has legal authority to employ personnel and receive and expend funds. The Ransom County SCD board has a track record for personnel management and addressing conservation issues.

3.6 Operation and Maintenance

Project staff will ensure that any Section 319 funded BMPs are properly installed and operated throughout the BMP life span. Cropland BMPs such as no-till, nutrient management, and pasture/hayland plantings will be monitored every year of their lifespan. Any structural BMPs will be evaluated the first year and spot-checked thereafter. A signed O&M agreement will accompany any structural BMPs requiring engineering assistance (in the design packet). These agreements will outline proper operation and maintenance for the landowner to follow. Practices implemented with life spans longer than the project's life span will be the responsibility of the NDDH. In some cases, such as livestock containment facilities, permits from the NDDH will enforce the O&M of the system throughout its life. If a producer abandons or destroys a BMP before the end of the life span, the producer will be required to pay back all Section 319 funds given previously for the installation of the BMP (appendix C4)

4.0 Coordination Plan

4.1 Cooperating Organizations

- 1) Ransom County Soil Conservation District (RCSCD)- The Ransom County SCD will be the signer of the Section 319 contract and will be the lead agency responsible for project administration. They will provide vehicles, clerical assistance, and supplies as well annual financial support. The RCSCD board will oversee implementation of the scheduled project activities and provide for staff time if feasible. The board will be the primary supervisor of the watershed coordinator and all section 319 funded activities.
- 2) Ransom County Water Resource Board (RCWRB) – The RCWRB will provide technical assistance to the watershed conservationist when necessary. The RCWRB may also provide financial assistance for the Sheyenne River Watershed Project.
- 3) Natural Resource Conservation Service (NRCS) – The NRCS will provide office space and equipment. They will also provide day to day assistance in conservation planning, plan writing, contract writing, and technical assistance for construction and installation of planned BMPs. Standards and specifications for approved BMPs will be provided by local NRCS personnel from the Electronic Field Office Technical Guide (eFOTG). EQIP funds will also be available.
- 4) North Dakota Department of Health (NDDH) – The NDDH will oversee 319 funding as well as develop the quality assurance project plan (QAPP) for this project. The NDDH will provide training for proper water quality sample collection, preservation, and transportation to ensure reliable data is obtained. The stated NPS information and education coordinator will assist the project staff in development and implementation of the project’s I/E activities. The NDDH will provide the sponsor oversight to ensure proper management and expenditures of Section 319 funds. They will assist NRCS and the RCSCD personnel in review of O&M requirements for Section 319 funded BMPs.
- 5) Farm Service Agency (FSA) – Programs available through FSA will be pursued for cost-share assistance.
- 6) North Dakota Extension Service (EXT) – Local and State personnel and education materials will be utilized to compliment the project’s I/E activities. The specific role of EXT will be dependent on the type of I/E activity being implemented and the availability of EXT staff and materials.
- 7) North Dakota Game & Fish Department (NDG&F) – The NDG&F will provide technical assistance thru the “Save Our Lakes” (SOL) program. They will also manage any riparian easements supported with 319 funds.

4.2 Local Project Support

Letters the Ransom County Water Resource Board, NRCS and the North Dakota Game and Fish Department are attached in appendix E.

4.3 Funding Coordination

The funding of best management practices in the Sheyenne River Watershed project area will be coordinated with Environmental Quality Incentives Program (EQIP) funding from the 2008 Farm Bill. The watershed conservationist and NRCS staff will work closely to determine how 319 and EQIP funds can be utilized to provide the most cost effective benefits to producers, the EQIP program, and the 319 program.

4.4 Other Watershed Activities

The Ransom County SCD is currently implementing the Ransom County Lower Sheyenne Watershed Project 2005-2010. This project is set to expire on June 30th, 2010.

5.0 Evaluation and Monitoring Plan

5.1-5.3 SAP and Monitoring Strategy

The project sponsors are currently coordinating with the ND Department of Health to develop the Quality Assurance Project Plan (QAAP). The QAAP will be included in the final PIP when it is fully approved. (appendix D).

5.4 Modeling

The AGNPS v.3.65 model was used in correlation with an intensive land use survey to determine critical areas within the Dead Colt Creek Dam Watershed. The model was run using current conditions determined during the land use assessment. The model was run a second time, depicting a best case scenario in which all critical cells were treated using BMPs. The AGNPS v.3.65 model is a single event model that has twenty input parameters. Sixteen parameters were used to calculate nutrient/sediment output, AFO inventories, surface runoff and erosion. The parameters used were receiving cell, aspect, SCS curve, percent slope, slope shape, slope length, Mannings roughness coefficient, K-factor, C-factor, P-factor, surface conditions constant, soil texture, fertilizer inputs, point source indicators, COD factor and channel indicator.

The primary objective for using the AGNPS 3.65 model was to : 1) evaluate NPS contributions within the watersheds, 2) identify critical areas within the watershed. The Dead Colt Creek Dam Watershed (HUC 09020204-060) was analyzed using the 25th percentile method. Cells with total phosphorous levels above 3.37 lbs/ac were identified as critical.

A summary of the AGNPS model is shown below.

Dead Colt Creek Dam Watershed Summary

Watershed Studied	Dead Colt Creek
The area of the watershed is	35680.00 acres
The area of each cell is	40.00 acres
The characteristic storm precipitation is	4.10 inches
The storm energy-intensity value is	103.93
<u>Values at the Watershed Outlet</u>	
Cell number	3 000
Runoff volume	1.59 inches
Peak runoff rate	9000.85 cfs
Total Nitrogen in sediment	2.23 lbs/acre
Total soluble Nitrogen in runoff	1.52 lbs/acre
Soluble Nitrogen concentration in runoff	4.21 ppm
Total Phosphorus in sediment	1.11 lbs/acre
Total soluble Phosphorus in runoff	0.29 lbs/acre
Soluble Phosphorus concentration in runoff	0.82 ppm
Total soluble Chemical Oxygen Demand in runoff	41.92 lbs/acre
Soluble Chemical Oxygen Demand concentration in runoff	116.39 ppm

Each ¼ ¼ of land was given a cell number. Each cell represents 40 acres of land. A total of 35,680 acres were input into the program representing 892 cells. The model identified 14,480 acres of cropland and 844 acres of pasture/rangeland to be inputting critical rates of sediment, nutrients and phosphorous. There were no livestock feeding areas identified as being critical.

This amounts to 38.4% of the watershed (appendix A1). The model was run a second time depicting a best case scenario, in which all critical areas were treated. The BMPs used during the second run were no till, nutrient management, prescribed grazing and buffer strips. The BMPs were reflected within the model by making changes in the input parameters. The results from the second run showed that nutrient loading could be reduced by 60 to 70 %. The results of the AGNPS modeling were used to set target rates for BMP installation for the Sheyenne River and Dead Colt Creek Watersheds.

Approximately 18% (2,710 acres) of the critical areas were treated using BMPs during the 2005-2010 Ransom County Lower Sheyenne Watershed Project (appendix A2). The AGNPS model was kept current for the Dead Colt Creek Dam Watershed during this project. The model was run showing these areas as treated. The model showed an approximate 15% reduction in nutrient loading into the Dead Colt Creek Dam

One main conclusion can be drawn from the AGNPS results for the Dead Colt Creek Watershed, 1) cropland/pasture/rangeland is inputting critical rates of nutrients and sediments into the Dead Colt Creek Dam. The implementation of essential BMPs to critical cells in the watershed will greatly improve the water quality of the Dead Colt Creek Dam. Additional AGNPS data is on file with the Ransom County Soil Conservation District.

The AGNPS 3.65 computer model will be used to evaluate and monitor the effectiveness of installed BMPS. Installed BMPS will be input into the computer model on a quarterly basis. The model will then be rerun to determine specific reductions in pollutants. The results will be included in the annual reports for the project.

5.5 Long-term Funding

No long-term funding by Section 319 funds is necessary. Operation and maintenance of restoration activities are the sole responsibility of the landowner, whether public or private.

6.0 Budget

6.1 Project Budget

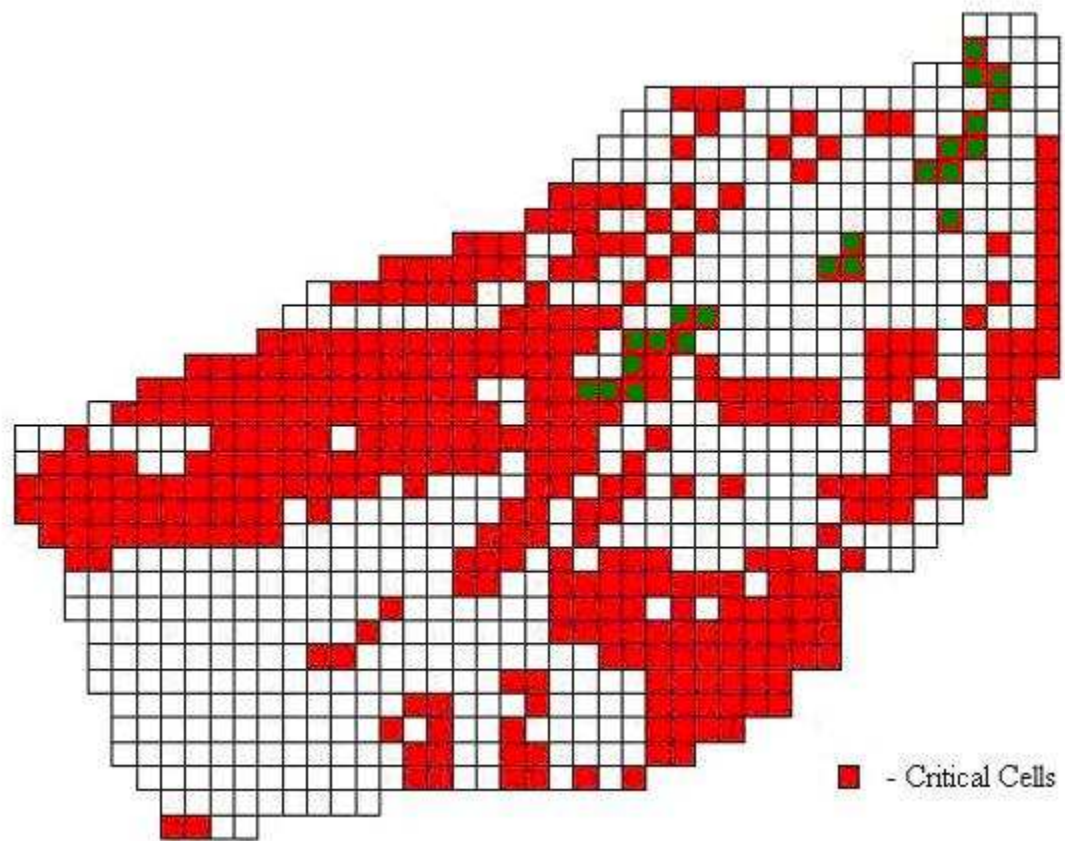
See attached budget tables part1 (appendix C1) and part 2 (appendix C2) and the 319/EQIP/FSA BMP budget (appendix C3). The budget has been figured for a five-year period 2010-2014.

7.0 Public Involvement

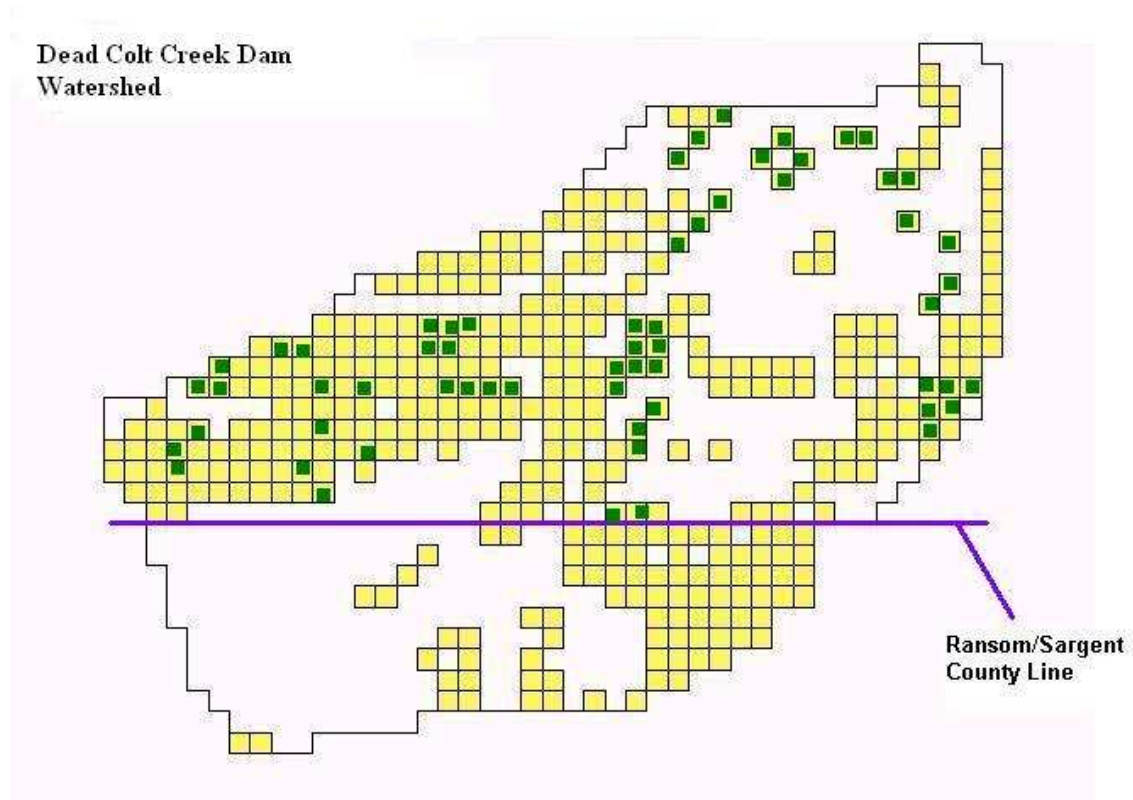
The Ransom County Soil Conservation District sponsored the 2005-2010 Ransom County Lower Sheyenne Watershed Project. They also sponsored the 2003-2004 Sheyenne River Assessment project and the 2003-2004 Dead Colt Creek TMDL project. The public was involved on all projects. The Ransom County SCD sponsors an EcoEd camp every year for local seventh grade students at the Fort Ransom State Park. This camp is used to inform youth of natural resource conservation issues. They also sponsor conservation speakers at local schools. They also sponsor educational tours and demonstrations each year in the county to inform the public on conservation measures. The Ransom County SCD feels that public involvement in the Sheyenne River Watershed Project is guaranteed.

Appendix A
AGNPS maps

A1

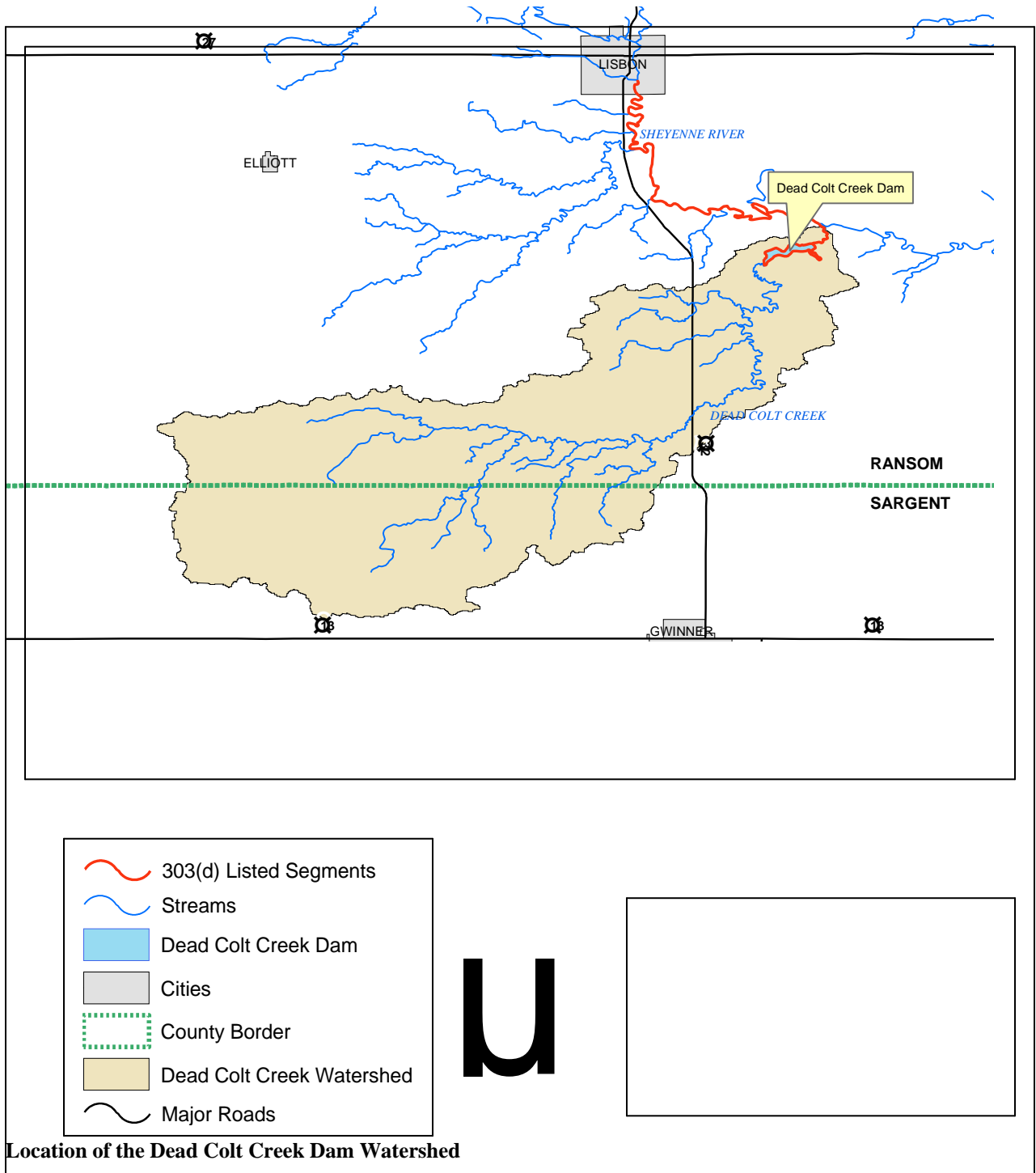


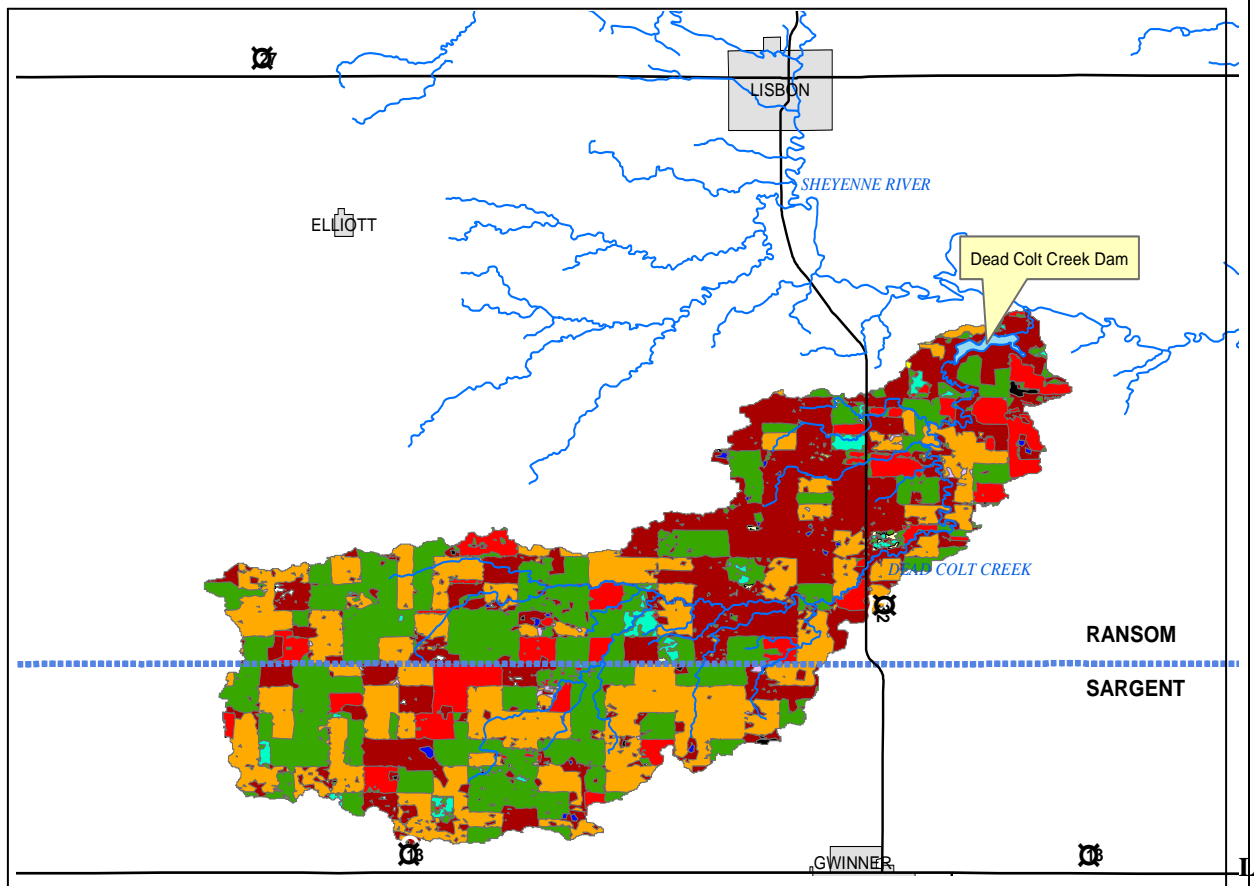
AGNPS identification of critical areas for BMP implementation
(red cells indicate cropland, green cells indicate pasture/rangeland)



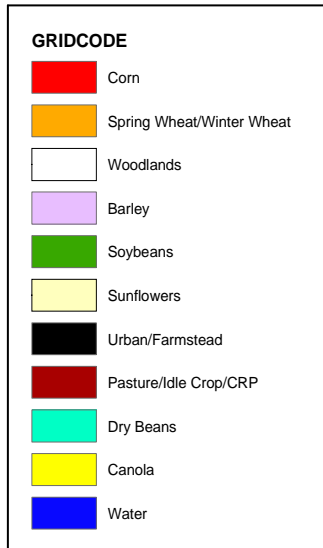
Yellow cells indicate critical areas. The green cells are cells that had BMPs installed during the 2005-2010 Ransom County Lower Sheyenne Watershed Project.

Appendix B
Reference Maps

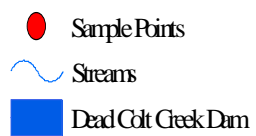
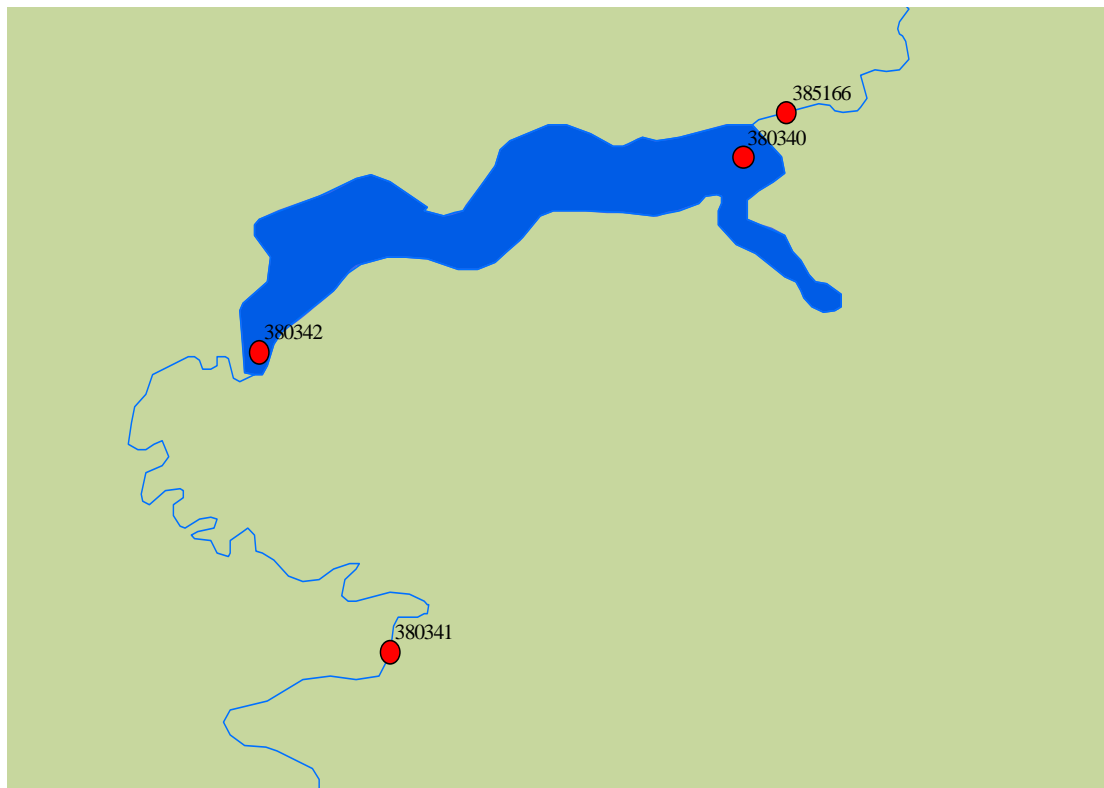




Landuse within the Dead Colt Creek Dam Watershed



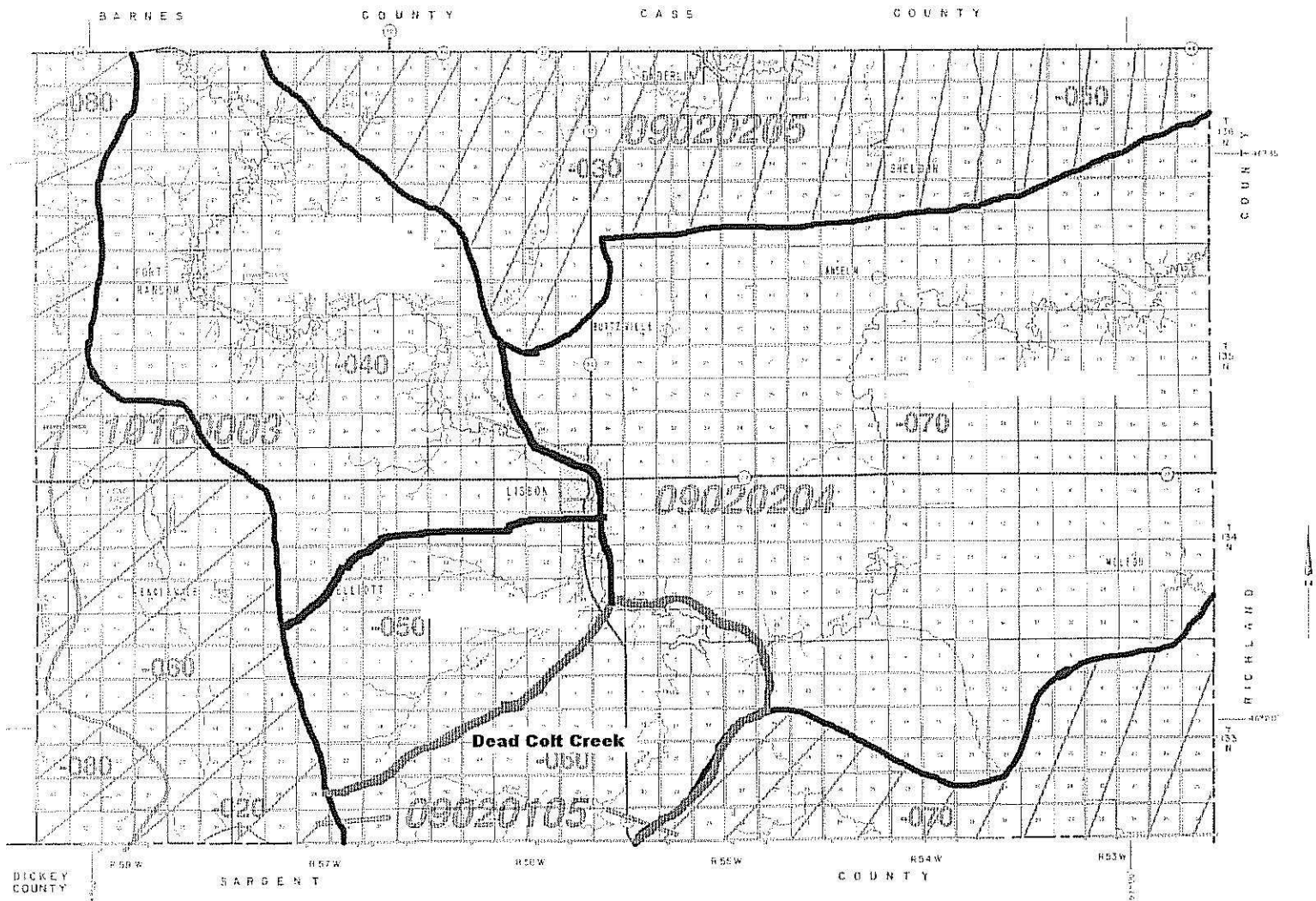
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Dead Colt Creek Dam Sample Locations and Station IDs

94



AGNPS Units

Lower Yellowstone River Watershed Boundary



Ransom County

Hydrologic Unit Map
Modified from 1974 USGS Base Map

SCALE 0 1 2 3 4 5 6 MILES
0 1 2 3 4 5 6 7 8 9 KILOMETERS

Appendix C
Budget, BMP tables, O&M agreement, Milestone

C1 Budget Table for Dead Colt Creek TMDL Implementation Project

	2010	2011	2012	2013	2014	Total Cost
EPA 319 Funds	113,991.60	113,991.60	113,991.60	113,991.60	113,991.60	569,958.00
Subtotal	113,991.60	113,991.60	113,991.60	113,991.60	113,991.60	569,958.00
Other Federal Funds						
1) NDDH (TA)	1,000.00	1,000.00	1,000.00	1,000.00	1,000.00	5,000.00
2) NRCS - IEQIP (FA)	66,000.00	66,000.00	66,000.00	66,000.00	66,000.00	330,000.00
3) FSA (CCRP) (FA)	100,000.00	100,000.00	100,000.00	100,000.00	100,000.00	500,000.00
Subtotal	167,000.00	167,000.00	167,000.00	167,000.00	167,000.00	835,000.00
State/Local Match						
1) Ransom County SCD (TA/FA)	22,580.00	22,580.00	22,580.00	22,580.00	22,580.00	112,900.00
2) Landowners (TA/FA)	53,414.40	53,414.40	53,414.40	53,414.40	53,414.40	267,072.00
Subtotal	75,994.40	75,994.40	75,994.40	75,994.40	75,994.40	379,972.00
Total Budget	356,986.00	356,986.00	356,986.00	356,986.00	356,986.00	1,784,930.00

FA- Financial Assistance

TA- Technical Assistance

NRCS - Natural Resource Conservation Service

FSA- Farm Service Agency

SCD- Soil Conservation District

C2 Dead Colt Creek TMDL Implementation Budget

Section 319/non federal budget										Total	Local	Section	NRCS		
										Cost	Cash	319	EQIP		
										2014		Funding	Funding		
										2013					
										2012					
										2011					
										2010					
<u>Objective 1: coordination/personnell/support</u>															
1) salary/fringe										50,000.00	50,000.00	50,000.00	250,000.00	100,000.00	150,000.00
2) travel										2,000.00	2,000.00	2,000.00	10,000.00	4,000.00	6,000.00
3) equipment/supplies										600.00	600.00	600.00	3,000.00	1,200.00	1,800.00
4) training										500.00	500.00	500.00	2,500.00	1,000.00	1,500.00
5) telephone										850.00	850.00	850.00	4,250.00	1,700.00	2,550.00
Subtotal										53,950.00	53,950.00	53,950.00	269,750.00	107,900.00	161,850.00
<u>Objectives 2 Conservation Planning</u>															
1) Cropland BMP's										66,160.00	66,160.00	66,160.00	330,800.00	132,320.00	198,480.00
2) Range/Pasture BMP's										3,376.00	3,376.00	3,376.00	16,880.00	6,752.00	10,128.00
3) Riparian Easements										64,000.00	64,000.00	64,000.00	320,000.00	128,000.00	192,000.00
4)filterstrips/bufferstrips															500,000.00
Subtotal										133,536.00	133,536.00	133,536.00	667,680.00	267,072.00	400,608.00
<u>Objective 3 : Monitoring</u>															
1) Postage										500.00	500.00	500.00	2,500.00	1,000.00	1,500.00
2)Equipment										500.00	500.00	500.00	2,500.00	1,000.00	1,500.00
Subtotal										1,000.00	1,000.00	1,000.00	5,000.00	2,000.00	3,000.00
<u>Objective 4 : I/E programs</u>															
1) workshop,tours,meetings										1,000.00	1,000.00	1,000.00	5,000.00	2,000.00	3,000.00
2) newsletters,articles,mailings										500.00	500.00	500.00	2,500.00	1,000.00	1,500.00
Subtotal										1,500.00	1,500.00	1,500.00	7,500.00	3,000.00	4,500.00
Total										189,986.00	189,986.00	189,986.00	949,930.00	379,972.00	569,958.00
															830,000.00

C 3

Dead Colt Creek TMDL Implementation Project BMP Budget

AGNPS		EPA Section 319 Budget				
Land use	Critical areas	Target %	Units to Treat	Cost/Unit	Total cost	Best Management Practices
<u>Dead Colt Creek</u>						
Cropland	11,270	88%	10,000 ac	\$10	\$100,000.00	Nutrient Management
		44%	5,096	\$40	\$203,850.00	Cover crops
		6%	770 ac	\$35	\$26,950.00	Pasture/hayland plantings
		4%	500 ac	\$640	\$320,000.00	Riparian Easements
Pasture	844	100%	844ac	\$20	\$16,880.00	Prescribed Grazing Systems (pipelines, tanks, wells, crossfences)
					\$667,680.00	Total BMP Costs

AGNPS		<u>EQIP/FSA Budget</u>				
Land use	Critical areas	Target %	Units to Treat	Cost/Unit	Total cost	Best Management Practices
cropland *	11270 ac	88%	10,000 ac	\$33	\$330,000.00	Notill/striptill *
		4%	500 ac	varies	\$500,000.00	filterstrips/bufferstrips **
					\$830,000.00	Total BMP Costs

EPA 319 Funding Agreement Provisions
(Attachment to EPA 319 CPO)

Each undersigned person agrees to participate in the EPA 319 Water Quality Long Term Agreement (LTA) and to comply with the following terms set forth and approved by the Sponsoring Agencies for the period covered by this agreement. The terms are as follows:

1. The conservation and/or environmental problems identified herein represent all the major concerns whereby increased water quality improvements will be achieved on this land unit which will directly or indirectly improve the total water quality of the watershed project. The corrective measures needed for the identified problems are contained in the Conservation Plan of Operations (CPO) as approved by the Governing Board Sponsors. All practices shall be performed according to the CPO and in accordance with the Natural Resources Conservation Service (NRCS) standards and specifications in effect at the time the practice is performed. The practices shall be maintained for their normal lifespans even though the agreement may expire. The practices eligible for cost share assistance will be in accordance with the agreed upon CPO or subsequently revised CPO and will be shown by year scheduled and copies of revised CPO will be issued to the farm operator.
2. Application of the EPA 319 Water Quality Funds for cost share on practices performed under this agreement will be made on a Sponsoring Board approved payment application form which upon approval will become part of this agreement.
3. Each undersigned person is jointly and severally responsible for compliance with the terms and conditions of this agreement as to the conservation and environmental problems identified in the CPO which are to have corrective measures performed on the land units on which the undersigned is an owner or operator and for refund of payments determined in accordance with the following regulations for failure to comply with the terms and conditions of this agreement.
 - A. The undersigned voluntarily destroys the practice(s) installed.
 - B. The undersigned voluntarily relinquish control and/or title to the land on which the installed practices have been established and the new owner and/or operator of the land does not agree in writing to properly maintain the practices installed for the remainder of its specified lifespan and/or continue to fulfill the remaining contract requirements.
 - C. Practice failure is determined by sponsors to be caused primarily by the fault of the undersigned.
 - D. Any part of the CPO that is not followed or completed as scheduled will be a contract violation and refund of all cost shared contract items will be collected depending on the violation hearing and ruling of the Board Sponsors, unless advance notification and revision of the CPO is completed prior to the scheduled contract items completion date.
4. The undersigned is aware that all land units identified in the CPO will not be listed under any other contract through this program or any similar program. Intentional violation of this section will void the entire contract and refund of all payments will be required.

I certify that I have read and understand the provisions listed above:

Signature: _____

Date: _____

C5

Dead Colt Creek TMDL Implementation Project Milestone Table

Task/Responsible Organizations		Output	Qty.	Year 1 2010	Year 2 2011	Year 3 2012	Year 4 2013	Year 5 2014
Objective 1:	Entity 1							
Task 1	Employ watershed conservationist	Watershed Conservationist	1	1				
Objective 2:	Entity 1,2,3							
Task 2	Conservation planning	Conservation plans	25	5	5	5	5	5
Task 3	Riparian improvements	Buffers/filter strips	10	2	2	2	2	2
Task 4	Operation/Maintenance checkups	Database of BMPs	1			ongoing		
Objective 3	Entity 1,4							
Task 5	Document water quality trends	Water quality samples						
Task 6	Compile WQ Data and BMP records	Documentation for reports	ongoing			ongoing		
Objective 4	Entity 1							
Task 7	Organize and conduct I/E events	Workshops,tours, meetings	15	3	3	3	3	3
Task 8	Project promotion through media	Newsletters, articles, mailings	36	6	6	6	6	6
Task 9	Complete reports	Semi-annual/annual/final reports	6	1	1	1	1	2

Entity 1 - Ransom County SCD - Local project sponsor, responsible for project coordination, reimbursement payments, match tracking, and progress reporting to the NDDH. Also provides technical assistance to plan, design and implement BMPS.

Entity 2 - Landowners in the Dead Colt Creek Watershed in Ransom County - Make land management decisions and provide cash and in-kind match for BMPs.

Entity 3 - Natural Resource Conservation Service - Provides technical assistance to the Ransom County SCD for implementation of BMPs. Also provides financial assistance for BMPs to landowners through the EQIP program.

Entity 4 - North Dakota Department of Health- Statewide section 319 program management including oversight of local 319 planning and expenditures. Also provides technical assistance for water quality analysis and documentation.

Appendix D
Quality Assurance Project Plan (QAAP) for the Dead Colt Creek TMDL Implementation Project

The completed QAAP will be added to the final PIP after it is fully approved.

Appendix E
Letters of Support

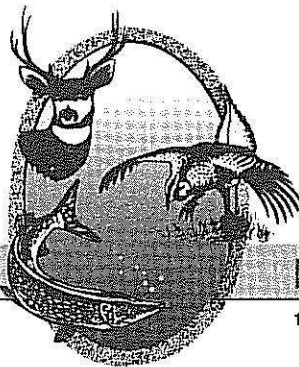
July 7, 2009

Ransom County SCD
PO Box 431
Lisbon, ND 58054-0431

Dear Supervisors:

The Ransom County Water Resource Board is in support of the Dead Colt Creek TMDL Implementation Project. We feel this project will benefit water quality and address natural resource concerns within the Dead Colt Creek watershed. As owners/operators of the Dead Colt Creek Dam and its recreation area we feel this project will greatly benefit the reservoir.
Sincerely,

James Lyons
Chairman



"VARIETY IN HUNTING AND FISHING"

NORTH DAKOTA GAME AND FISH DEPARTMENT

100 NORTH BISMARCK EXPRESSWAY BISMARCK, NORTH DAKOTA 58501-5095 PHONE 701-328-6300 FAX 701-328-6352

Ransom County SCD
701 Main Street
Lisbon, North Dakota 58054

August 6, 2009

Dear Mr. Nannenga:

The North Dakota Game & Fish Department fully supports your efforts and grant proposal in improving the water quality of Dead Colt Creek and subsequently Dead Colt Creek Dam. The Ransom County SCD and your efforts in putting projects on the ground not only improve water quality but ultimately the fishery of our states water bodies. If at any time during your project period you would like assistance with your efforts please do not hesitate to contact me. The North Dakota Game and Fish Dept., specifically the Save Our Lakes Program is always looking to improve our states water quality and partnerships are an important part of that process. Good Luck!

Best Regards,

A handwritten signature in dark ink, appearing to read 'Scott Elstad'. The signature is fluid and cursive, with a long horizontal stroke extending to the right.

Scott A. Elstad

Aquatic Habitat Supervisor
North Dakota Game & Fish Department
100 North Bismarck Expressway
Bismarck, North Dakota 58501-5095

Appendix F
Sections 7 and 8 of the Dead Colt Creek TMDL Report

A full copy of the Dead Colt Creek Dam Final TMDL Report is available on the ND Department of Health's web site. The web address is as follows:

http://www.ndhealth.gov/WQ/SW/Z2_TMDL/TMDLs_Completed/B_Completed_TMDLs.htm.

7.0 TMDL

7.1 Nutrient TMDL

Table 14 summarizes the nutrient TMDL for Dead Colt Creek Dam in terms of loading capacity, wasteload allocations, load allocations, and a margin of safety. A TMDL can generically be described by the following equation.

$$\text{TMDL} = \text{LC} = \text{WLA} + \text{LA} + \text{MOS}$$

Where:

LC = loading capacity, or the greatest loading a waterbody can receive without violating water quality standards;

WLA = wasteload allocation, or the portion of the TMDL allocated to existing or future point sources;

LA = load allocation, or the portion of the TMDL allocated to existing or future non-point sources;

MOS = margin of safety, or an accounting of the uncertainty about the relationship between pollutant loads and receiving water quality. The margin of safety can be provided implicitly through analytical assumptions or explicitly by reserving a portion of the loading capacity.

Table 14. Summary of the Phosphorus TMDL for Dead Colt Creek Dam.

Category	Total Phosphorus (kg/yr)	Explanation
Existing Load	638.0	From observed data
Loading Capacity	191.4	70 percent total reduction based on BATHTUB and AGNPS modeling
Wasteload Allocation	0.0	No point sources
Load Allocation	172.3	Entire loading capacity minus MOS is allocated to non-point sources
MOS	19.1	10% of the Loading Capacity (191.4 kg/yr) is reserved as an explicit margin of safety

Based on data collected in 2002 and 2003, the existing load to Dead Colt Creek Dam is estimated at 638.0 kg. Assuming a 70% based on BATHTUB and AGNPS modeling results in Dead Colt Creek Dam reaching a TMDL target total phosphorus concentration of 0.041 mg L⁻¹, then the TMDL or Loading Capacity is 191.4 kg.

7.3 Dissolved Oxygen TMDL

AgNPS and BATHTUB models indicate that excessive nutrient loading is responsible for the low dissolved oxygen levels in Dead Colt Creek Dam. Wetzel (1983) summarized, “The loading of organic matter to the hypolimnion and sediments of productive eutrophic lakes increases the consumption of dissolved oxygen. As a result, the oxygen content of the hypolimnion is reduced progressively during the period of summer stratification.”

Carpenter et al. (1998), has shown that nonpoint sources of phosphorous has lead to eutrophic conditions for many lake/reservoirs across the U.S. One consequence of eutrophication is oxygen depletions caused by decomposition of algae and aquatic plants. They also document that a reduction in nutrients will eventually lead to the reversal of eutrophication and attainment of designated beneficial uses. However, the rates of recovery are variable among lakes/reservoirs. This supports the Department of Health’s viewpoint that decreased nutrient loads at the watershed level will result in improved oxygen levels, the concern is that this process takes a significant amount of time (5-15 years).

In Lake Erie, heavy loadings of phosphorous have impacted the lake severely. Monitoring and research from the 1960’s has shown that depressed hypolimnetic DO levels were responsible for large fish kills and large mats of decaying algae. Binational programs to reduce nutrients into the lake have resulted in a downward trend of the oxygen depletion rate since monitoring began in the 1970’s. The trend of oxygen depletion has lagged behind that of phosphorous reduction, but this was expected (See: <http://www.epa.gov/glnpo/lakeerie/dostory.html>).

Nürnberg (1995, 1995a, 1996, 1997), developed a model that quantified duration (days) and extent of lake oxygen depletion, referred to as an anoxic factor (AF). This model showed that AF is positively correlated with average annual total phosphorous (TP) concentrations. The AF may also be used to quantify response to watershed restoration measures which makes it very useful for TMDL development. Nürnberg (1996), developed several regression models that show nutrients control all trophic state indicators related to oxygen and phytoplankton in lakes/reservoirs. These models were developed from water quality characteristics using a suite of North American lakes. NDDoH has calculated the morphometric parameters such as surface area ($A_o = 41,400$ acres; 167.5 km^2), mean depth ($z = 18.3$ feet; 5.58 meters), and the ratio of mean depth to the surface area ($z/A_o^{0.5} = 0.43$) for Dead Colt Creek Dam which show that these parameters are within the range of lakes used by Nürnberg. Based on this information, NDDoH is confident that Nürnberg’s empirical nutrient-oxygen relationship holds true for North Dakota lakes and reservoirs. NDDoH is also confident that prescribed BMPs will reduce external loading of nutrients to the Dam which will reduce algae blooms and therefore increase oxygen levels over time.

Best professional judgment concludes that as levels of phosphorus are reduced by the implementation of best management practices, dissolved oxygen levels will improve. This is supported by the research of Thornton, et al (1990). They state that, “... as organic deposits were exhausted, oxygen conditions improved.”

To insure that the implementation of BMPs will reduce phosphorus levels and result in a corresponding increase in dissolved oxygen, water quality monitoring will be conducted in accordance with an approved Quality Assurance Project Plan.

8.0 ALLOCATION

This TMDL will be implemented by several parties on a volunteer basis. Phosphorus loads into the reservoir will be reduced by 70% by treating of the AGNPS identified critical areas (Figure 11). There are 397 cells within the Dead Colt Creek watershed identified as “critical” by AGNPS modeling. These cells represent a total area of 14,480 (cropland) and 844 (pasture/rangeland) acres, or 38.4% of the watershed. If 38.4% of the critical watershed areas can be treated with appropriate BMPs, then the specified reduction is possible. Further, internally derived phosphorus reductions will also be achieved through hypolimnetic withdrawal within the reservoir.